

CLAIMS

Please cancel claims 1-27 without prejudice and enter new claims 29-54.

Claims 1-27 (Canceled)

28. (Original) A method for ultrasonically chemically-etching a workpiece, said method comprising

providing an inner tank having an inner surface comprising a chemically-resistant polymer and defining an upper mouth and being receptive to the workpiece, wherein said inner tank is at least partially disposed within an outer tank at least partially filled with an aqueous solution;

at least partially filling the inner tank with at least 1 liter of a etching solution having a total acidity or basicity of at least 10%;

immersing the workpiece into the etching solution;

covering the mouth of the inner tank with a lid to enclose the etching solution and to increase the partial pressure above the etching solution; and

ultrasonically agitating the etching solution with an ultrasonic transducer coupled to the outer tank to accelerate the etching of the workpiece.

29. (New) The method of claim 28, further comprising a heating element for regulating the temperature of the aqueous solution.

30. (New) The method of claim 28, further comprising a mechanism adapted to impart relative motion between the workpiece disposed in said inner tank and said ultrasonic transducer.

31. (New) The method of claim 30, wherein the mechanism comprises a rod extending through the lid and coupled to the workpiece.
32. (New) The method of claim 28, further comprising an exhaust hood which is located above the tanks and compatible with gases produced from at least one of the aqueous solution and the etching solution.
33. (New) The method of claim 28, further comprising an ultrasonic buffer positioned within the aqueous solution for dampening and/or diffusing the sonic energy imparted to the etching solution.
34. (New) The method of claim 28, wherein the ultrasonic transducer is positioned outside of the aqueous solution and is operably connected to a power oscillator.
35. (New) The method of claim 28, further comprising a probe positioned within the etching solution for monitoring one or more of the ultrasonic energy, temperature, temperature variations and impurity concentration.
36. (New) The method of claim 28, wherein the aqueous solution is a filtered and recirculated deionized water bath.
37. (New) The method of claim 28, wherein the etching solution is essentially static.
38. (New) The method of claim 28, wherein the inner tank and any portion of the rotational mechanism that may come into contact with the etching solution

comprises a material selected from the group consisting of a fluorine resin and high density polyethylene.

39. (New) The method of claim 38, wherein the inner tank generates less than 10 ppb of leachable metal contaminants and 10 ppm of leachable anionic and organic contaminants.

40. (New) The method of claim 28, wherein the etching solution comprises an acid selected from the group consisting of hydrofluoric acid, nitric acid and hydrochloric acid.

41. (New) The method of claim 40, wherein the acidic solution comprises hydrofluoric acid, nitric acid and water in a ratio selected from the group consisting of 1:1:1, 1:2:2 and 1:7:4.

42. (New) The method of claim 28, wherein the temperature of the aqueous solution is maintained from about 20°C to about 50°C.

43. (New) The method of claim 28, wherein the workpiece is selected from the group consisting of silicon carbide, quartz, ceramic and silicon.

44. (New) The method of claim 30, wherein the mechanism comprises a rotary motion actuator for rotating said substrate about an axis.

45. (New) The method of claim 44, wherein the axis is a substantially horizontal axis.

46. (New) The method of claim 44, wherein the axis is a substantially vertical axis.
47. (New) The method of claim 30, wherein the mechanism comprises a rotary motion actuator for rotating said inner tank and/or said ultrasonic transducer.
48. (New) The method of claim 28, wherein the cross-section of the lid is substantially the same as the cross section of the mouth of the inner tank.
49. (New) The method of claim 48, wherein the mouth of the inner tank and the lid each have a circular shape corresponding to the cross-section of the lid.
50. (New) The method of claim 28, wherein the cross-section of the inner tank is substantially the same as the cross section of the workpiece.
51. (New) The method of claim 28, wherein the mouth of the inner tank has a shape selected from the group consisting of a square, rectangle, triangle, circle and oval.
52. (New) The method of claim 28, wherein the inner tank has a shape selected from the group consisting of a rectangular parallelepiped, cube and cylinder.
53. (New) The method of claim 28, wherein the etching solution comprises a base selected from the group consisting of sodium hydroxide and potassium hydroxide.

54. (New) The method of claim 53, wherein the etching solution comprises 30% potassium hydroxide.